

# **Ideal-Gas Heat Capacities of HFC Refrigerants Determined from Gaseous Speed-of-Sound Measurements**

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The  $c_p^0$  value is often estimated and calculated by means of a theoretical method with spectroscopic data. On the other hand,  $c_p^0$  values can be determined from speed-of-sound measurements. More than ten years ago, there existed only theoretically calculated  $c_p^0$  values. In the past decade, the  $c_p^0$  values based on speed-of-sound measurements have begun to be reported.. The experimental  $c_p^0$  values, unfortunately, do not completely agree with theoretical values, e.g., these discrepancies reached 0.6%, 0.5%, 1.0%, 2.0% and 0.8% for the HFC refrigerants R-32, R-152a, R-143a, R-134a, and R-125, respectively..

Yokozeki et al. recently re-evaluated these  $c_p^0$  values theoretically in detail to resolve this problem in cooperation with our study of gaseous speed-of-sound measurements. In this process, he had checked or corrected all chemical properties at each step to derive the  $c_p^0$  values for HFCs. On the other hand, we strictly examined our speed-of-sound measurements for R-32, R-152a, R-143a, R-134a, and R-125 in this study.

Concerning R-125 and R-143a, we re-measured the speed of sound and re-determined the  $c_p^0$  values which were different from previous results by as much as-1%. By the results of new measurements and re-evaluation of Yokozeki *et al.*, the discrepancies between theoretical and experimental  $c_p^0$  values vanished.

As a result of our study, we propose a new temperature function of  $c_p^0$  for each HFC which is effective in temperature range of 200 K - 500 K and evaluate the uncertainties of the calculated results.